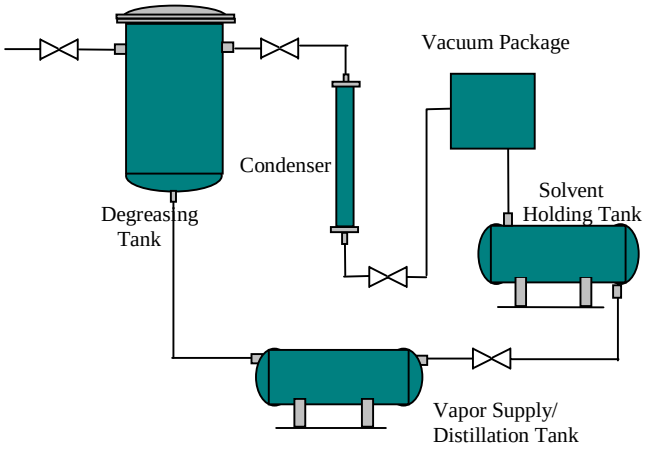
*Innovative Environmental Technology Fact Sheet*

# Serec Corporation Airless Vacuum Vapor Degreasing

January 2000

**Introduction:** This fact sheet is a concise summary of a more detailed analysis conducted for the Massachusetts Strategic Envirotechnology Partnership (STEP) by the Toxics Use Reduction Institute through funding from the Environmental Protection Agency - Region 1. For further information on the full report, see the National Pollution Prevention Roundtable's web site, at http://www.p2.org, or contact Paul Richard at (617) 626-1042. For further information on the Serec system, contact Serec Corporation at (401) 421-6080.




**Description/Definition:** Serec's patented high vacuum, airless vapor degreasing technology utilizes organic solvents to clean metal parts in a unique process. The process is compatible with a wide variety of substrates, solvents, and contaminants, including: most metal and ceramic substrates; precision parts such as metal honey comb, polished bearing surfaces, silicone wafers, castings and PM parts, electronic connectors, and tubing; many organic solvents; contaminants such as oils, grease, wax, and particulate matter; clean room applications; and custom applications. The Serec process never mixes solvent with air.

**Advantages:** Advantages of the Serec system include:

- Dramatically decreased solvent use
- 97 to 99% reduction in degreaser air emissions
- Dramatic reductions in worker exposure to airborne solvents and emissions
- Elimination of NESHAP reporting
- BACT and LAER compliant

**Typical Equipment:** The Serec airless vacuum vapor degreaser is sized by capacity in pounds of parts degreased per hour (for steel) and by degreasing chamber dimension. The Serec system can be "dropped-in" in place of an open top vapor degreaser. The Serec system employs a programmable logic controller (PLC) that makes the technically sophisticated equipment simple to operate. The PLC permits the user to customize up to eight menus, such as cleaning cycles, which can employ one or a combination of vapor degreasing, soak (with or without ultrasonic), and spray steps, in different sequences, duration, and temperatures.

**Performance/Effectiveness:** Four applications of the Serec system were independently reviewed and demonstrated the following success:

- Electro-Spec, Inc.[1] – 95% reduction in solvent use (to 1.5 lbs./day)

[1] Electro-Spec, Inc., located in Franklin, Indiana, is a plating shop that serves the electronic connector industry.

- A.T. Wall[2] - 97% reduction in solvent use and 75% reduction in hazardous waste
- Texas Instruments[3] - two units with solvent air emission reductions of
- 99% (less than 20 gallons/year combined)
- Poclain Hydraulics[4] - no solvent was added during the first six months of use.

Capital and operational costs of the units vary. Systems reviewed in this study range from $300,000 for a custom model at A.T. Wall to $91,000 for a 200-800 lbs./hr. capacity unit at Electro-Spec, Inc.

**Technology Status:** Traditionally businesses have used open-top vapor degreasing with organic solvents to clean their parts, but this has become less practical due to more stringent regulations. Some manufacturers have switched to aqueous cleaners because they are environmentally friendly; however, not all parts can be cleaned using aqueous systems. Serec's system combines the cleaning effectiveness of solvent cleaners with the decreased environmental risk and relative safety of aqueous cleaners. Serec's design represents significant improvements over early attempts at vacuum degreasing.

[2] A.T. Wall, located in Warwick, Rhode Island, is a manufacturer of a variety of products including wave guide tubes used to carry or transmit microwave radiation.

[3] Texas Instruments (TI) is a large manufacturer of electronic devices and electronic components; two departments at the TI plant in Attleboro, Massachusetts installed the degreaser.

[4] Poclain Hydraulics is a manufacturer of hydraulic motors and pumps for the automotive industry based in France and recently opened a plant in Sturtevant, Wisconsin.

**Applications:** Serec's process is compatible with most metal and ceramic substrates including precision parts such as metal honey comb, polished bearing surfaces, silicone wafers, castings and PM parts, electronic connectors, and tubing. Serec has already sold systems to the electronic connector, aerospace, honeycomb manufacturing, medical, and capacitor manufacturing industries. The process is compatible with many organic solvents and a variety of contaminants such as oils, grease, wax, and particulate matter.

**Practical Considerations:** Many of the units Serec sells involve some type of custom design, typically to the degreasing chamber and for part loading/racking/baskets/rotation requirements. The applications that have proven to be the most challenging for Serec systems are precision cleaning related, where a firm wants to remove insoluble particles from the parts, which requires complicated soak, flushing, rotation, and ultrasonic action.

**Reliability/Maintenance:** The PLC includes various alarm points, such as vapor pressure, tank pressure, torr levels in working tanks, and temperature readings, that alert the system operator if system set points are exceeded. A phone-line connection allows Serec technicians to read system parameters on site or from a remote location. All moving parts are surrounded by threaded connectors so that the parts can be replaced if necessary. A preventative maintenance schedule is supplied with all equipment, which calls for periodic inspection and replacement activities at specified time intervals.